

SYSTEM

Mixed Air Single Path, Constant Volume Air Handling Unit

CONFIGURATION: Return Air Temperature Control Constant Air Volume with Supply and Return Fans

The supply and return fans will operate continuously in this mode.

Return Air Temperature Setpoint

The building operating engineer will set the return air temp, setpoint by adjusting the retrum air setpoint, RA-SP form any ISC terminal. The digital controller will modulated controlled devices as described below to maintain a fan return air temperature of 75 F.

Return Temperature Loop

The return cooling deadband is added to the return air setpoint. This value establishes the point at which mechanical cooling begins when the controller uses proportional only control. The digital controller will continually adjust the damper and mechanical cooling command in sequence according to the controller's result of the proportional-intergal cooling loop calculation. The digital controller modulates the controlled devices until the return air temperature equals the calculated return setpoint. The digital controller will continually adjust the heating command according to the controller's result of the proportional-integral heating loop calculation. The digital controller will modulate the heating control valve, Y-1, nixed air dampers, DA-1-DA-3 and cooling control valve, Y-2 until the discharge air temperature equals the setpoint. The controller will provide an output between 0 and 100 percent as the return air temperature travels through the proportional bands.

The state of 'Heating Mode' and 'Cooling mode' will lockout the operation of the controlled device, Y-1 and Y-2 if the respective mode is set 'Dff'. The PID control algorithm will sequence the heating and cooling devices so that both do not operate in the same proportional band.

The digital controller will control the nixed air dampers between minimum and 100 percent in the occupied mode and from 0 percent in the unoccupied mode.

The mixed air low limit setpoint and the mixed air low limit proportional band will establish a back off effect to the mixed air damper output command. This happens when the mixed air temperature. IE-2 decreases into the range of the mixed air low limit proportional band. This back-off feature multiplies the damper command by the proportional percentage of the mixed air in temperature inside the mixed air low limit proportional band. The mixed air low limit proportional band is reset inversely by 20 degrees between outdoor air temperatures of 40 and -30 degrees F.

Dry Bulb Economizer Switchover

When the outdoor air tenperature is greater then the Econo Swithcover setpoint, 68 F.(Adj.) the digital controller commands the mixed air dampers to minimum position(Adj.). When the outdoor air temperature decreases below the Econo Switch Setpoint minus the Econo Switch Differential, the controller modulates the mixed air dampers to provide free cooling. When ECDN is on, free rooling is most label.

Control systems, AHJ-5001 - AHJ-5018 will use a common outside air temperature value while the digital controller is online with its controlling NCM. In the event that communication is lost the controller will operate using the temperature element that is handwired to that system, TE-3.

The digital controller will enter the heating node at outdoor air temperatures below 45 F. The digital controller will position the cooling control valve at

Cooling Mode

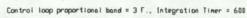
The digital controller will enter the cooling mode at outdoor air temperatures above $50\,\mathrm{F}$. The digital controller will position the heating control valve at zero percent.

The supply/return fans system will stop and the mixed air dampers will be positioned at zero percent in the event that the heating coil discharge drops below 37 F.(adjustable) at temperature switch, TS-1.

The mixed air filter condition will be nonitored by differential pressure switch, PS-4. The switch will close in the event that the pressure drop exceeds .8 (adjustable) inches VG and an alarm will be sent to the ICS network, 'Dirty Mixed air filter'.

The snoke detectors' condition will be monitored by the digital controller. The alarm contact will close in the event that snoke is detected in the the supply or return ductors and an alarm will be sent to the ICS network, "Supply(or return) snoke detected". The supply and return fans will stop through a hardwire interlock in the event that either snoke detector is activated.

The digital controller will modulate control valve, Y-5 to maintain a CHWR temperature setpoint of 47 F. at temperature element, TE-10 at EN-02001.



Control loop parameters will be adjustable from the controller CS object.

Upon loss of air flow as determined by sensitive pressure switches, PS-1 and PS-2 the following controlled devices will be commanded to the following

- Heating valve, V-1 will remain in control.

 Cooling valve, V-2 will be positioned at zero percent.

 Mixed air dampers, DA-1-3 will be positioned at zero percent.

 Return and supply fan positions will be commanded to zero percent.

Unoccupied Mode

The supply and return fans will remain off and the controlled devices will be commanded to the positions indicated above under "Loss of Air Flow".

Upon a command from the higher level digital controller, NC-0, the AHU digital controller will command all analog outputs to zero percent and will turn off all binary outputs.

Power Fail Restart

The power fail restart will delay the startup of the digital controller for 1 minute after a power failure for controller reset condition. This logic will hold the controller in the sutdown mode until the restart timer has expired.

The following point objects/attributes will be adjustable from the ICS terminals:

-Heating and Cooling lockout setpoints
-Cooldown temperature setpoint(return air)

The following point objects/attributes will be monitored/alarmed at the ICS terminals:

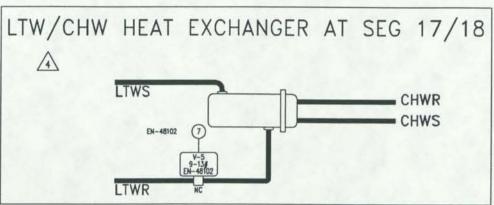
-Electric low limit temperature switch, TS-1 status -Hixed air filter differential pressure alarm, PS-5 -Supply and Return fan status, PS-1 and PS-2 -Snoke detectors, SD-1 and SD-2 status

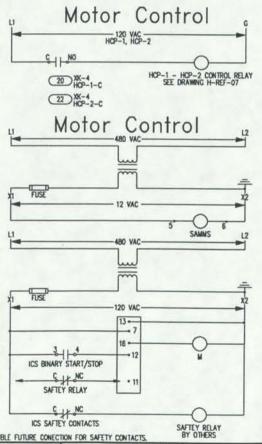
Heating Vater Circulating Pumps

The digital controller will start the lead pump at the start of the heating mode In the event that the lead pump fails, the lag pump will be started. The lead/lag designation can be changed at the operator's descretion by scheduling binary data point "HCP-LL".

DEVICE TAG DTY CODE NUMBER DESCRIPTION SENSITIVE DIFF PRES CTL REMOTE MTD PROBE TEMP SENSING ELEMENT 17' PS-1-PS-2.4 54 P32AF-2C TEMPERATURE TRANSMITTER 100 DHM PT, RTD ENCLUSURE TEMP CONTROL 36 VIRE, 18 -C SEE VALVE SCHEDULE TF-4.5 36 TQ-6000 36 TEA-K000000 36 BZ-1000-6 SEE VALVE SCHEDULE 1 1/2 INCH N.C. E.P. CTRL VLV SEE SCHEDULE SEE SCHEDULE SEE SCHEDULE 0-30 PSI, 1/2 INCH PRESSURE GAUGE DIFF PRESSURE SVITCH V-5 DA-1-DA-3 DA-1-DA-3 1 V-5464-1 144 G-2010-5 36 P74FA-5C ACC PS-5-PS-6

ANY MATERIAL WITH A (P) PRECEEDING THE DEVICE TAG IS CONSIDERED PROPRIETARY EQUIPMENT AND IS BEING SUPPLIED BY JOHNSON CONTROLS, INC. ALL DTHER MATERIAL IS NON-PROPRIETARY EQUIPMENT





FILE: AHU_5001 LEADER LINE INDICATES POSSIBLE FUTURE CONECTION FOR SAFETY CONTACTS CODE: 19940303.1649 RECORD 05/20/94 SF Air Handling Units AHU-5001 4 HE AT SEG 17/18 03/03/94 95 thru AHU-5018 3 GENERAL NO. REVISION-01/03/93 SF DATE BY Single Path, Mixed Air, SALES ENGRPROJECT NGR APPL ENGR DRAWN
JP SF DCS BY SF DATE 02/14/92 APPROVED DATE Constant Volume ONTRACT NUMBER JAHNSON CONTROLS 3007 MALMO ROAD ARLINGTON HEIGHTS The Argonne National Labs 91390-0009 ILLINOIS 60005 708/364-1500 Main 708/806-4438 Eng Advanced Photon Source Compus DRAWNG NUMBER 9700 Cass Avenue South Systems & Services Division Argonne, IL 60439

COPYRIGHT JOHNSON CONTROLS, INC. 1993